

REMARKS

The above amendments and these remarks are responsive to the Office action dated May 6, 2004. Claims 1-7 are pending in the application. Claims 1-7 are rejected. In particular, claims 1-7 are rejected under 35 U.S.C. § 112, second paragraph; claims 1, 2, 5, and 7 are rejected under 35 U.S.C. § 102(b); and claims 2 and 6 are rejected under 35 U.S.C. § 103(a).

Applicants has amended claims 1, 3, 4, and 5. In view of the above amendments and the following remarks, applicant requests reconsideration of the rejected claims.

Rejections under 35 U.S.C. § 112

The examiner has rejected claims 1-7 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter that the applicants regard as the invention.

In particular, the examiner indicates that the language of claim 1, line 3, is vague and confusing. In response, applicants have amended claim 1 to recite "a flank" rather than "an flank".

Additionally, the examiner indicates that the language of claims 3 and 4, line 5, is vague and confusing. In response, applicants have amended claims 3 and 4 to recite the phrase "each of the predetermined angles is different as rake angles" rather than the phrase "the predetermined angles are different each other as rake angles".

Applicants further take this opportunity to correct typographical errors in the claims. In particular, claim 1 is amended to recite "a rotational axis" rather than "an

rotational axis"; and to replace "deviating" with "deviates". Claim 5 has been amended to replace "rake angle" with "the rake angle". Applicants suggest these amendments are purely formal, and do not effect the scope of the claims.

Applicants respectfully suggest that claims 1-7, as amended, particularly recite distinctly define the claimed subject matter. Applicants therefore request the withdrawal of the rejection of claims 1-7 under 35 U.S.C. § 112, second paragraph.

Rejections under 35 USC § 102

Claims 1, 2, 5, and 7 are rejected under 35 U.S.C. § 102(b) as being anticipated by DE 196 09 904 A1 (Ryoko Seiki Co.), hereafter referred to as DE '904. Applicants respectfully disagree and traverse the rejection.

The ball end mill of claim 1 includes a semi-circular cutting blade at the tip of a tool main body that rotates around a rotational axis. As recited in claim 1, the cutting blade deviates from the rotational axis of the tool main body by a predetermined distance. This is shown most clearly in the embodiment depicted in Figures 1A and 1C of the instant application, where cutting blade 4 deviates from the rotational axis 2a of the tool by a distance d.

In contrast, the DE '904 reference describes a ball end mill with a disposable cutting tip. The cutting tip of the DE '904 ball end mill is located on plate 8, which is retained in a cutout 2 at the end of a tool main body 1. However, the cutting blade on plate 8 does not deviate from the rotational axis of the tool. As shown in Figure 2 of DE '904, the cutting edge is centered on plate 8. In addition, plate 8 is inserted into the tool

main body 1 so that the centerline of plate 8 agrees with the centerline of the tool main body, as shown in Figure 6 and described in line 65 of column 3 to line 5 of column 4 of the DE '904 reference.

Additionally, as shown in the English abstract for the priority Japanese application (JP 07-084929; copy enclosed), the purpose of the apparatus depicted in the DE '904 reference is provided as to "remarkably improve finishing accuracy against a workpiece by firmly fixing a tip under the condition in which *the center line of the tip is automatically conformed to the center line of an end mill main body* at fitting the tip to the end mill main body" (emphasis added).

In order for a reference to anticipate a claim, it must disclose each and every element of the claim. The DE '904 reference fails to disclose a ball end mill having a cutting blade that deviates from the rotational axis of the tool by a predetermined distance. Applicants therefore respectfully request that the rejection of claims 1-7 under 35 U.S.C. § 102(b) be withdrawn.

Rejections under 35 USC § 103

Claims 2 and 6 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the DE '904 reference. Claims 3 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over the DE '904 reference in view of Anjanappa et al. Applicants respectfully traverse the rejections, and suggest the examiner has failed to establish the *prima facie* obviousness of claims 2, 3, 4, and 6.

In order to establish the *prima facie* obviousness of the claims, the prior art must teach or suggest each and every claim element. In addition, there must be a motivation or suggestion in the cited references to combine the teachings of the references.

As set out above, the DE '904 reference fails to disclose a ball end mill having a cutting blade that deviates from the rotational axis of the tool main body. Similarly, although Anjanappa et al. discloses a variety of masonry drill bits, the reference fails to disclose a ball end mill having a semicircular cutting blade, where the cutting blade deviates from the rotational axis of the tool main body by a predetermined distance.

Additionally, applicants suggest it would be improper to combine the DE '904 and Anjanappa et al. references, as the DE '904 reference is directed to ball end mills, while the Anjanappa et al. reference discloses concrete and masonry drill bits. Applicants suggest there is no motivation to combine the disparate teachings of the references.

Further, even if the references were properly combined, they fail to suggest the desirability of the applicants' claimed invention. The references, even in combination, fail to provide a reasonable suggestion that a ball end mill having a cutting blade that deviates from the rotational axis would be advantageous, much less that such a ball end mill would possess the substantial advantages set out in the instant specification, including a decreased cutting resistance, reduced abrasion of the cutting blade, and reduced


breakage of the cutting blade, while permitting a workface to be finished with high precision (see the instant specification at page 2, lines 22-27.

For at least the reasons provided above, applicants suggests that the examiner has failed to establish the *prima facie* obviousness of claim 1. As claims 2, 3, 4, and 6 depend directly or indirectly from claim 1, these claims are similarly not rendered obvious by the cited references. Applicants therefore respectfully request the withdrawal of the rejection of claims 2, 3, 4, and 6 under 35 U.S.C. § 103(a).

Applicants suggest that the pending claims are allowable over the cited prior art, and therefore request that the examiner issue a Notice of Allowability covering the pending claims. If the examiner has any questions, or if a telephone interview would in any way advance prosecution of the application, please contact the undersigned agent of record.

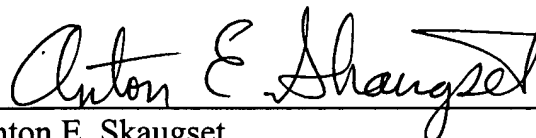
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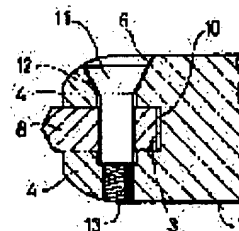
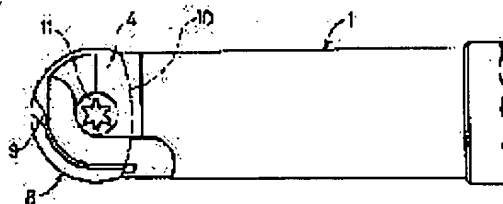
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(54) THROW AWAY TYPE BALL END MILL

(57)Abstract:

PURPOSE: To remarkably improve finishing accuracy against a workpiece by firmly fixing a tip under the condition in which the center line of the tip is automatically conformed to the center line of an end mill main body at fitting the tip to the end mill main body.

CONSTITUTION: The bottom face part of a cutout 2 on the extreme end side of an end mill main body 1 is formed into a circular-arc-like tip receiving face 3, a conical receiving face 6 deviated on the base end side is formed on one of cutout side parts 4, the rear end face 10 of a tip 8 is formed into a circular-arc-like curved face equal to the radius of curvature of the tip receiving face 6 or larger than it, and the tip 8 inserted into the cutout of the end mill main body 1 is fixed by means of a clamp screw member 11.



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